MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2018/2019

PAM0135 –ALGEBRA

(Foundation in Information Technology / Life Sciences)

31 May 2019
9.00 a.m - 11.00 a.m
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of **TWO** pages excluding the cover page and the Appendix.
2. Answer **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the Answer Booklet provided.
4. All necessary working steps **MUST** be shown.

Instruction: Answer **ALL** questions.

Question 1 [10 marks]

a. Solve the following inequality: $\frac{1}{x+1}-\frac{4}{x-1}>0$ (5 marks)

b. Simplify the expression: $\frac{4x^2+x-6}{x^2+3x+2}-\frac{3x}{x+1}+\frac{4}{x+2}$ (5 marks)

Question 2 [10 marks]

Solve the following equations:

a. $\log_4(4x+2)-2\log_4(x-1)=2$ (5 marks)

b. $2^{3x-1}.8=16^x$ (2 marks)

c. Given $f(x)=\sqrt{x+9}$ and $g(x)=x^2-2$. Find,

i. the domain of the two functions (1 mark)

ii. $(4f-2g)(7)$ (2 marks)

Question 3 [10 marks]

a. For the polynomial $f(x)=(x+4)(x^2-3x+2)$

i. Determine the x and y intercept of the graph of f. (2 marks)

ii. Determine whether the graph crosses or touches the x-axis at each x-intercept. (1 mark)

iii. End behavior: determine the power function that the graph of f resembles for large values of $|x|$ (1 mark)

iv. Determine the maximum number of turning points on the graph of f. (1 mark)

v. Put all the information together to obtain the graph of f. (3 marks)

b. Sketch the graph of the function $f(x)=3\log(x-1)$. Show clearly at least 2 points on the graph and the vertical asymptote. (2 marks)

Continued...

Question 4 [10 marks]

a. Use the Principle of Mathematical Induction to show that:

$2+5+8+...+(3n-1)=\frac{1}{2}n\,(3n+1)$. (5 marks)

b. In the expansion of $\left(2x+\frac{1}{2}\right)^{10}$, determine:

i. the coefficient of x^7. (2 marks)

ii. the first three terms of the expansion. (3 marks)

Question 5 [10 marks]

a. Determine a general formula of the arithmetic sequence.

10^{th} term is 0

18^{th} term is 8 (5 marks)

b. The third term and the six term of a geometric sequence is –26 and –1664 respectively.

i. Determine the first term and the common ratio of the sequence. The common ratio is a positive number. (3 marks)

ii. Compute the sum of the first 5 terms of the sequence. (2 marks)

End of Paper

APPENDIX

$a^2 - b^2 = (a-b)(a+b)$

$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

$(a+b)^2 = a^2 + 2ab + b^2$

$(a-b)^2 = a^2 - 2ab + b^2$

$(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$

$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

$\log_b b = 1$

$\log_b 1 = 0$

$\log_b (MN) = \log_b M + \log_b N$

$\log_b \left(\frac{M}{N}\right) = \log_b M - \log_b N$

$\log_b M^p = p \log_b M$

$\log_b M = \frac{\log_a M}{\log_a b}$

$a_n = a_1 + (n-1)d$

$a_n = a_1 r^{n-1}$

$S_n = \frac{n}{2}(2a_1 + (n-1)d) = \frac{n}{2}(a_1 + a_n)$

$S_n = \frac{a_1(1-r^n)}{1-r}$

$S = \frac{a_1}{1-r}$, infinite sum $|r| < 1$